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DIAMOND CROWN BIT

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The invention relates to the mining industry, and specifically to diamond crown bits designed for rotary-percussion drilling.

The diamond crown bit most similar to the invention in terms of concept and performance is one comprising a housing and a matrix with cutting diamonds on its lateral surface and larger diamonds on the face [1].

A disadvantage of such a crown is the arrangement of the large diamonds relative to each other, which does not take into consideration their joint action on the rock under dynamic load. This distance is greater than the optimal distance needed to achieve merging of the lunular cuts in the rock, and when a single shock is applied, point breakage is done to the bottom, which does not allow for efficient drilling.

The objective of the invention is to improve the operating efficiency of the diamond crown bit used in rotary-percussion drilling by ensuring merging of the lunular cuts in the rock.

This is achieved by relating the distance between the centers of the neighboring large diamonds and the diameter of the diamonds according to the following formula

$$\frac{l}{d} = \frac{1.9}{\sqrt[3]{K_{pl}}}$$

where d is the diameter of the diamond, mm;
l is the distance between diamonds, mm;
K_{pl} is the plasticity index of the rock.

Figure 1 shows the diamond crown bit, general view, with a partial section view; Figure 2 is a view of the working face of the crown; and Figure 3 shows schematically how the diamonds are arranged in a sector of the crown.

The crown bit has a housing (1) to which is affixed a matrix (2) having cutting diamonds (3) on its lateral edge and large diamonds (4) on its face. The large diamonds (4) are disposed in the matrix (2) in a triangular pattern, and the distance between the centers of the neighboring diamonds and the diameter of the diamonds are related by formula (1).

Disposing the large diamonds in the working part of the matrix in accordance with formula (1) allows for breaking the bottom by forming lunular cuts that merge, breaking the bottom of the hole over an area equal to the area of the corresponding sectors.

Since the most important factor responsible for breaking the rock in the operation of the claimed crown bit is the percussive load, the need to ensure high axial loads and high speeds of rotation of the core barrel is eliminated.

Bench tests of the crown bits have shown that using them increases the mechanical drilling speed by up to 17%, while at the same time reducing the consumption of diamonds by 30% compared to ordinary diamond crown bits.

<u>Claim</u>

A diamond crown bit comprising a housing and a matrix, with cutting diamonds on the latter's lateral surface and larger diamonds on the face, characterized in that, with the objective of

improving its operating efficiency in rotary-percussion drilling by ensuring the merging of the lunular cuts in the rock, the distance between the centers of the neighboring large diamonds is related to the diameter of the diamonds by the following formula

$$\frac{l}{d} = \frac{1.9}{\sqrt[3]{K_{pl}}}$$

where d is the diameter of the diamond, mm;
l is the distance between diamonds, mm;
K_{pl} is the plasticity index of the rock.

Sources of information considered in the examination

1. French Patent No. 1317937, Int. Cl. E 21 B, publ. January 7, 1963 (prototype).

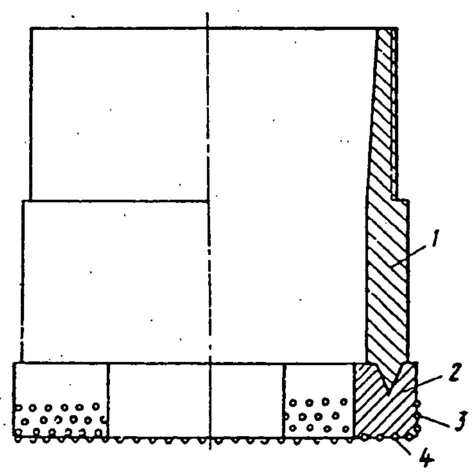

Figure 1

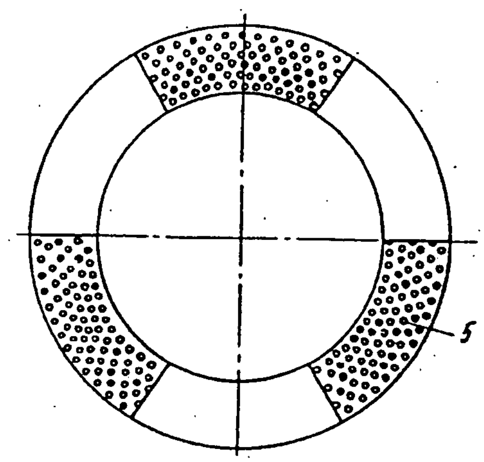

Figure. 2

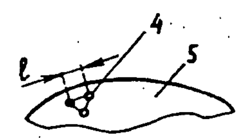

Figure 3